Line Distance Sampling

Evolution of the Transect Methods

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Sampling Methodology

- Include desert tortoise critical habitat and ACECs
- Exclude areas ≥1,250 meters in elevation (excluding *Coleogyne* habitat if possible)
- Include areas ≤ 30% slope

  (changed to 30^{o} in 2002 to increase area)
- Exclude non-habitat areas (i.e. playas)
- Exclude areas on private land

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Transect Methods

- 2-person crews, transect lengths 1.6 km (2001) 4 km (2002-2003) or 12 km (2004-2005)
- Purpose of change in method was to increase sample size in the light of a decreasing budget.

The single pass method (2004-05) ~70% of the encounter rate observed with multiple passes was achieved. Although, 2-3 X the transect length was sampled = more tortoises observed.

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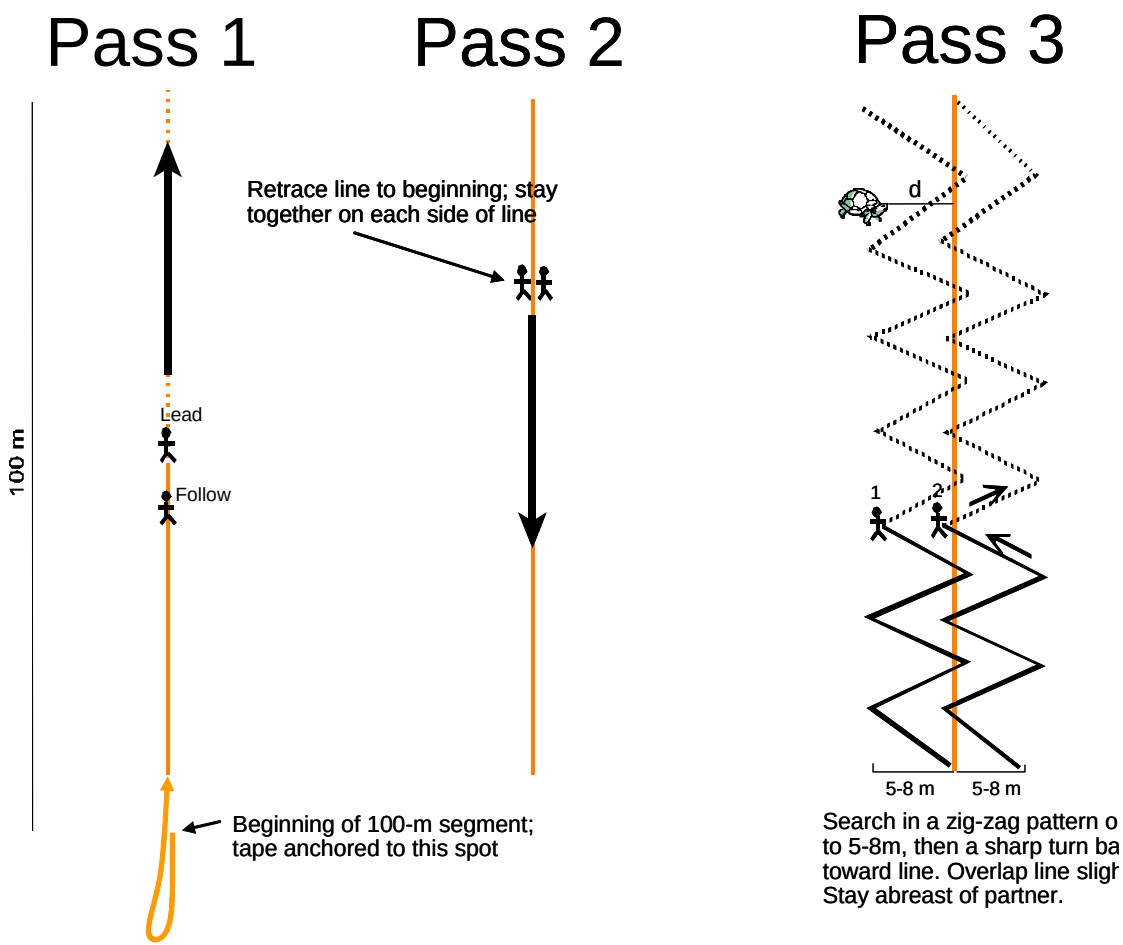
Line Distance Sampling Pattern 2001



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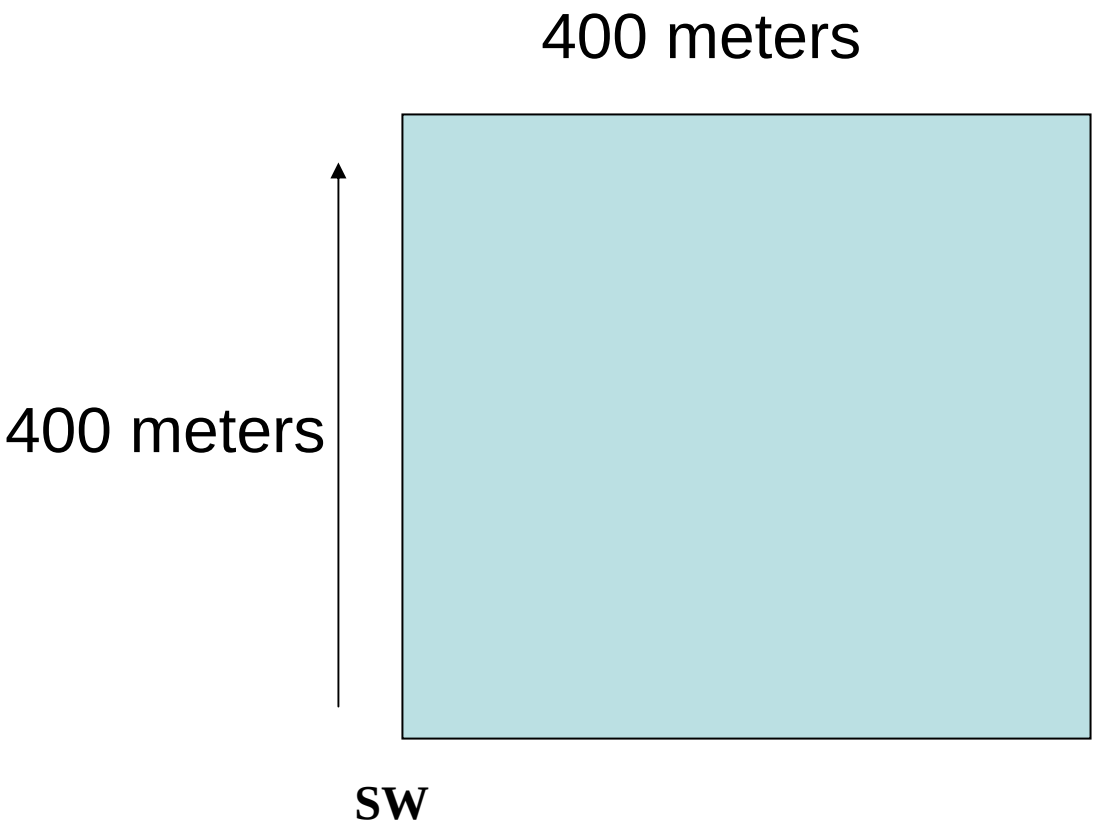
Line Distance Sampling Pattern 2001



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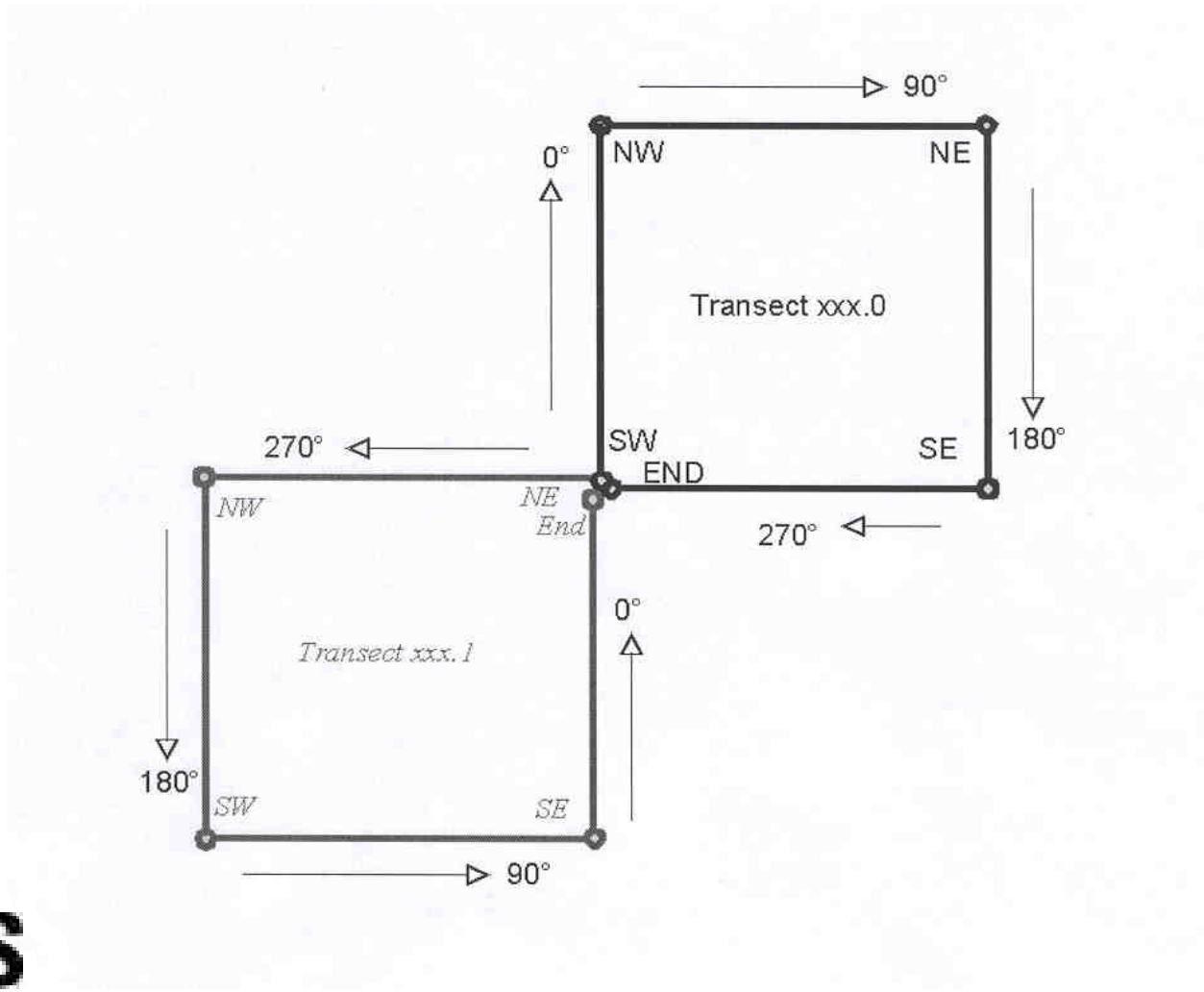
Line Distance Sampling Pattern 2002 & 2003



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Line Distance Sampling Pattern 2004-2005

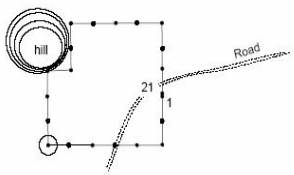

Fig. 9. Rerouting a transect to avoid a hazardous cliff area.

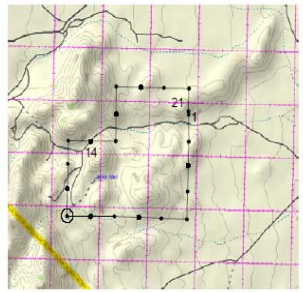

Fig. 10. Hypothetical example from Plute Valley, Nevada. Note point 1 is about 200 m North of the road to maintain 500-m segments. Alternatively, the start could be where point 14 is on this scheme.

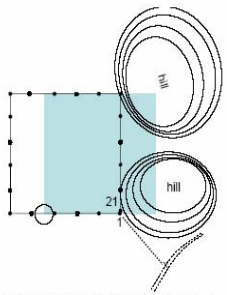

Figure 11. Shifting a transect west to avoid cliff areas.

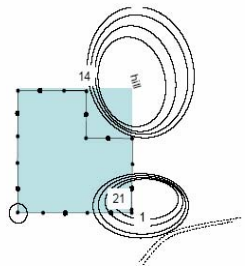

Fig. 12. Only situations where the crew feels unsafe should cause deflections. In this case, the southern hill should not be avoided just because it's a hill. Note point 14 remains on the lower slope of the hill to maintain 500-m segments.

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2001-2003: transect line laid on ground 100 m at a time; zig-zag search pattern

2004-2005: transect line created 'on the fly'; no zig-zag search pattern; leader and follower (double observer)

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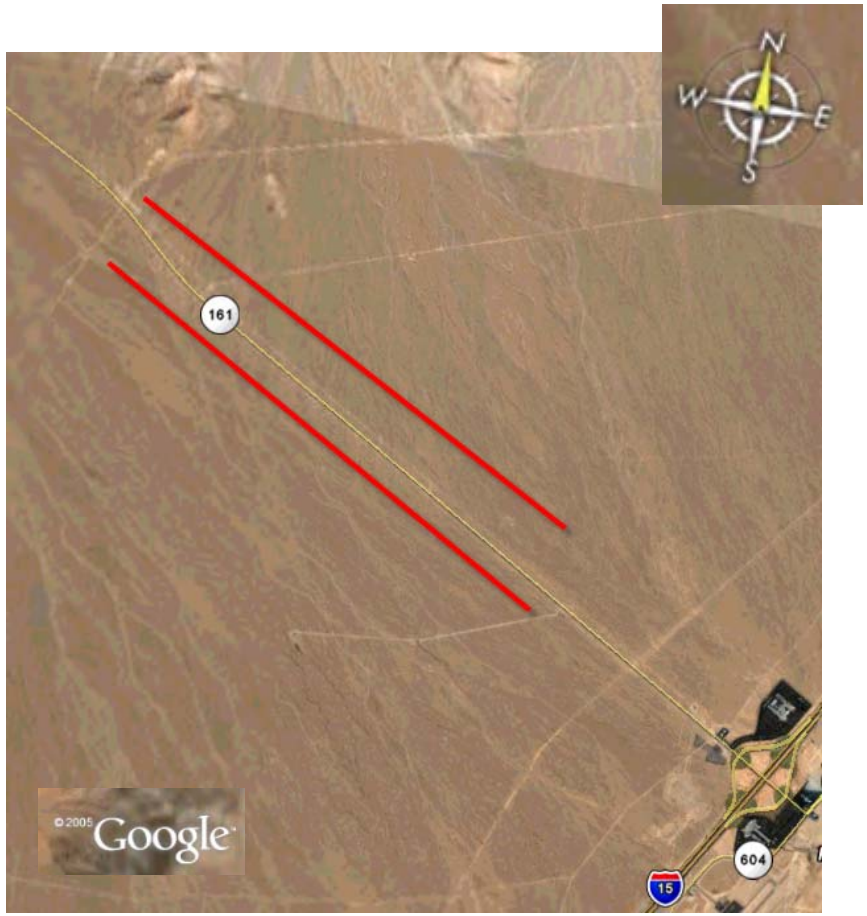
Training

- All personnel, regardless of experience trained
  - Every year
- Lectures
- Training lines with styrofoam tortoises
  - Known positions allow detailed analysis of performance
  - Painted models mimic real tortoises



8km of training lines NE of Jean, NV

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Which Are Real?

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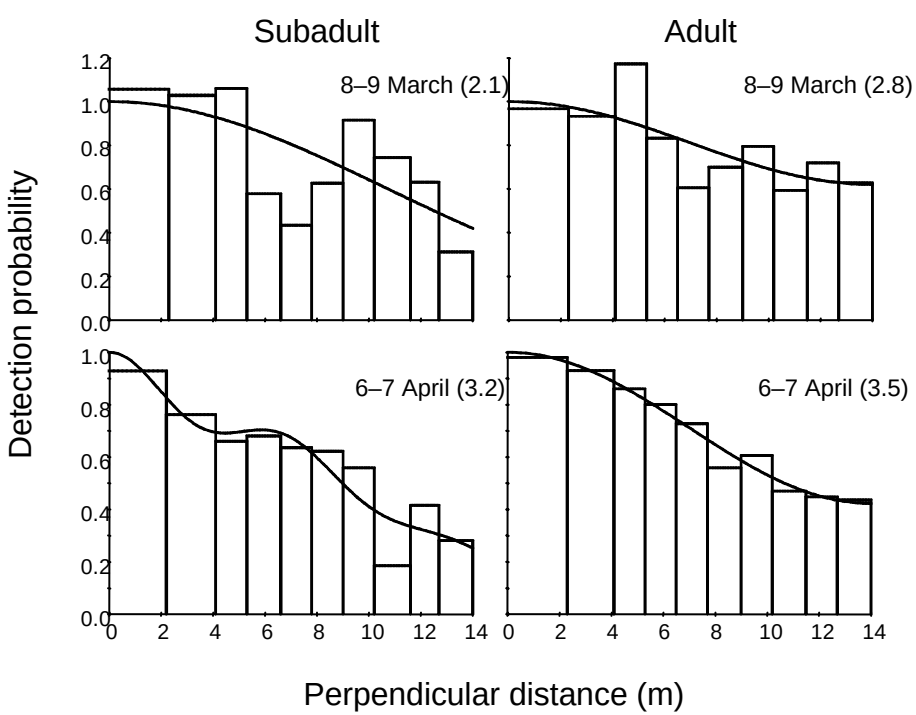
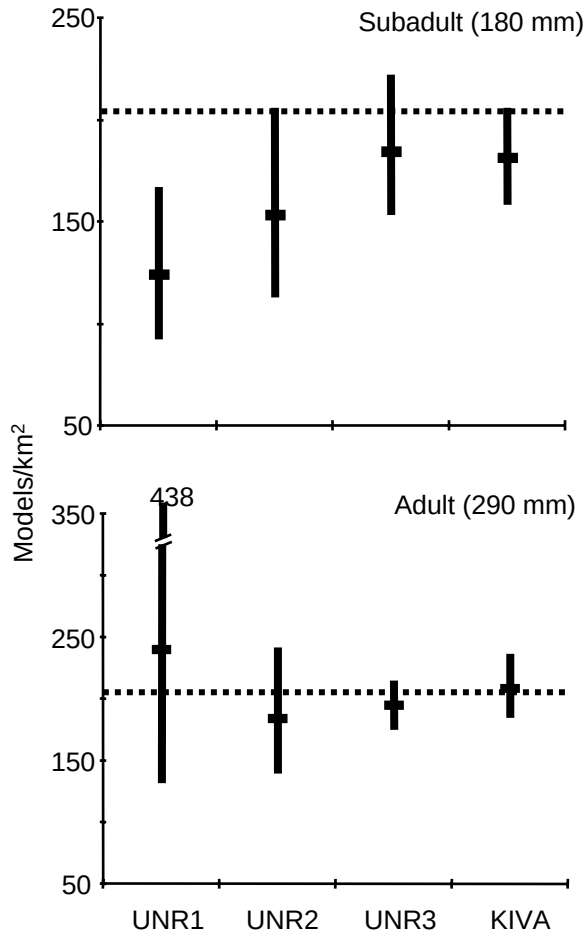
Repeat Training is Effective



- Inexperienced 2005
  - Top histograms – 1st training
  - Bottom histograms – 3rd training



- 2005 (dashed line = truth)
  - Inexperienced (UNR), episodes 1-3
  - Experienced (KIVA)

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Kilometers Sampled

Year	Kilometers
2001	3,410
2002	4,178
2003	4,200
2004	7,434
2005	~ 9,462

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